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## How to support the economic recovery of aviation after COVID-19?

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### Abstract

The still ongoing COVID-19 pandemic lead to the most significant decrease in global air transport passenger traffic in aviation history. This decrease has been caused by a combination of demand and supply shocks. Main reasons for these shocks were the global travel restrictions, border closures, the rules and regulations for physical distancing as well as income losses of both private companies and private households even though financial support has been provided by many governments. As a consequence, airlines worldwide had to cut down the number of operated routes and flights significantly. Since February 2020, both the number of global passengers and passenger flight kilometers decreased by 80 per cent and more). These developments have caused large financial losses both for airlines and airports worldwide, critically threatening the existence of a large number of these companies. This paper investigates whether and how the economic recovery of the aviation sector should be supported by governments. Our main results indicate that government loans or government secured loans are enabling a well-balanced trade-off between governmental influence, public debt and distortion of competition if the lending criteria are transparent and nondiscriminatory. However, in the course of time, over-indebtedness will become a critical issue for most companies. At this point, non-refundable state grants offer a relatively simple but costly solution since these subsidies will directly increase public debt.

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## 1. Background

The still ongoing COVID-19 pandemic has led to the most significant decrease in global air transport passenger traffic in the history of aviation. This development has been caused by a combination of demand and supply shocks. Main reasons for the demand shock were the global travel restrictions, border closures and the rules and regulations for physical distancing. Due to these health protecting measures, the predominant drivers for air transport demand, business and tourism, have been blocked. In addition, many potential travelers have been alienated from the risk of infection while traveling. Lastly, the COVID-19 pandemic resulted in income losses of both private companies and private households even though financial support has been provided by many governments. This caused an additional drop in demand.

On the supply side, these developments have been accompanied by governmental directives causing supply restrictions themselves, for instance national entry bans. As a consequence, airlines worldwide had to cut down the number of operated routes and flights significantly. In 2020, both the number of global passengers and passenger flight kilometers decreased by about 64 per cent (Airport Council International World, 2020). In absolute terms, average passengers per month dropped from 401 million (March – November 2019) to 115 million (March – November 2020) (Sabre MI, 2020). However, the world regions have been affected differently: While in the Americas, Western Europe, the Gulf region, Australia or North and Southern Africa air traffic declined by more than 75 per cent in the timeframe March to November 2020 as compared to 2019, the passenger decline in Far East Asia (-58%), Central Asia (-59%) or South East Asia (-69%) was considerably lower (own calculations on the basis of Sabre MI, 2020). At this point it should not be forgotten that an average growth in air traffic of about 4 per cent p. a. had been forecasted for 2020 ff. (Airbus, 2019; Boeing, 2019) before the pandemic took place. These developments have caused large financial losses both for airlines and airports worldwide, critically threatening the existence of a large number of these companies.

This paper investigates the question whether and by what kind of policy measures the economic recovery of the aviation sector should be supported by governments. First, we will take a closer look at the recent forecasts for the possible recovery of the global air transport sector (section 2). In section 3, we will analyze potential losses in GDP and employment in the aviation industry. In section 4, we will discuss the pros and cons of different policy measures providing (financial) support for airlines and/or airports. Finally, recommendations on how to support the air transport sector best from an economic point of view will be provided.

## 2. Possible recovery paths for global air transport after COVID-19 pandemic

As presented above, national and international aviation has experienced dramatic losses due to the COVID-19 pandemic. When and under which circumstances is a recovery likely? As of January 2021, a number of studies investigating this question has been published. According to the forecasts of the International Civil Aviation Organization ICAO (2020), which have been developed in cooperation with IATA Economics and IMF, it seems likely that global air traffic will return to about 72 per cent (Scenario 1) and 64 per cent (Scenario 2), respectively, of the baseline traffic numbers by the end of June 2021. The baseline represents the passenger numbers expected for the same timeframe forecasted before the COVID-19 pandemics took place. The ICAO forecast is updated on a monthly basis. Fig. 1 presents the most recent ICAO forecast as of 30 December, 2020.

Other studies on this issue have been published by Eurocontrol (2020) and Airport Council International (ACI) World (2020), inter alia. ACI World (2020) drew the conclusion that a return to the original growth path will be likely by 2023/2024. However, as of January 2021, in some regions of the world air traffic is growing strongly again. Especially the Chinese domestic market touches the baseline prognosis for this market in 2021 already (Sabre MI, 2021). The actual development of air traffic in the future mainly depends on the GDP and GDP per capita development, as these are the main drivers for air traffic demand. Of course, the rate of COVID-19 infections, vaccinations and the related governmental actions will also determine the development of air traffic demand and supply as explained above. In the past, however, global crises in aviation have been temporary. In the medium and long term, air transport returned to its original growth path regularly. This has been the case, for instance, after the global oil crises in the 70s, the Gulf war in the 80s, 9/11 and the Financial crises in the 2001 and 2008 ff., respectively (Gelhausen et al., 2020). Policy measures on national and international level may support this positive development.

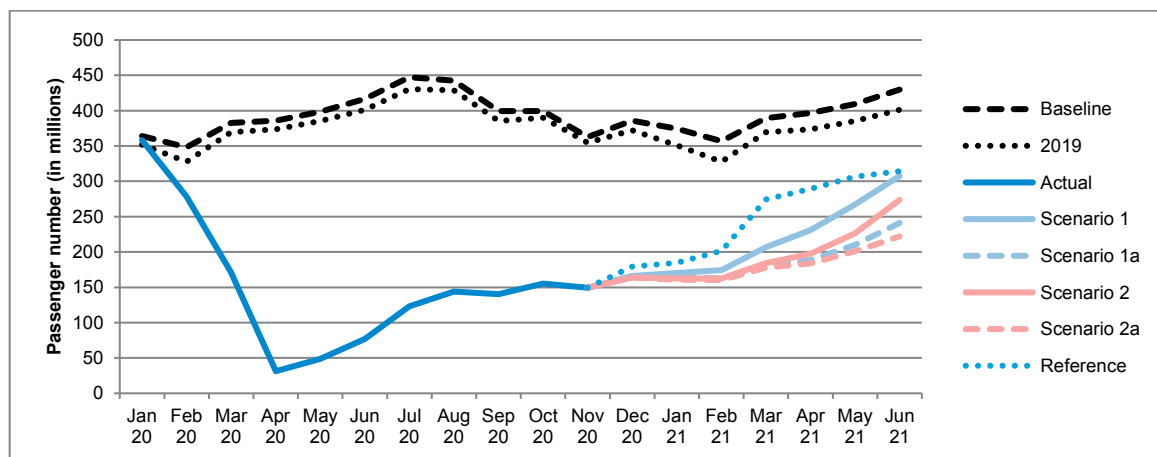


Fig. 1. Possible development of passenger numbers after COVID-19 pandemics (ICAO, 2020)

### 3. Potential GDP and employment impacts in the aviation industry

Based on the forecasts that global air traffic will not return to the level of 2019 in the short to medium term, a temporary decline in gross value added (GVA) and employment created by air transport is to be expected. We estimate these impacts in this section using the most recent ICAO forecast, economic industry data, and a macroeconomic model. The identified impacts include three effects that the production of air transport has on GVA and employment: (1) direct effects that arise from the economic activity within the air transport industry (i.e. the airlines), (2) indirect effects that result from the economic activity of industries upstream in the value chain (e.g. airports, aircraft manufacturers), and (3) induced effects that stem from consumption expenditures of the directly and indirectly employed for goods and services, which in turn leads to economic activity in the producing or providing industries.

Direct effects can be obtained from official statistics on the air transport industry. Indirect and induced effects have to be calculated using an empirical input-output table and an input-output model. Input-output tables show the flows of goods and services between industries and from industries to final consumers based on official empirical data. Input-output models link the purchased inputs of industries with their produced output via a production function, so that economic effects in upstream industries can be calculated.

For our analysis, we use the World Input-Output Table (WIOT) for the year 2014 (Dietzenbacher et al., 2015), the World Socio-Economic Accounts (Dietzenbacher et al., 2015), which include industry-level data on GVA, employment and labor compensation, and the classical input-output model, developed by Wassily Leontief, (Leontief, 1986). The data covers a large part of the global economy, including most developed countries (e.g. the EU countries, the UK, the US, Japan) and major developing countries (e.g. China, India, Brazil, Indonesia). This data is the basis for the direct effects. Indirect effects are an immediate result of the model. For induced effects, we first determine the labor income that is directly and indirectly created by air transport and derive the additional consumer demand, in order to then calculate the induced economic activity with the input-output model.

To extrapolate the effects identified for 2014 to 2019, we use the air traffic growth between the two years and assume a proportional relationship between economic effects and passenger numbers. In the medium term, a proportional relationship between economic effects and transport volume can be assumed, since far-reaching technological changes are unlikely within this timeframe and, with constant returns to scale, the necessary inputs (e.g. labour) rise or fall in proportion to output (transport volume). The impacts of COVID-19 are calculated analogously with the relative decrease in traffic compared to 2019. To estimate potential economic losses, we assume that traffic remains in the short to medium term at the level forecasted by the ICAO for mid-2021 (ICAO, 2020). ICAO forecasts declines in global passenger numbers compared to 2019 of -23% (scenario 1) and -32% (scenario 2).

The resulting economic effects are shown in Fig. 2. The potential loss worldwide, as covered by the WIOT data, amounts to a total annual GVA of between 228 to 310 billion USD in 2019 prices and total loss in employment of between 5.7 to 7.8 million jobs. This corresponds to a loss of between 0.26% to 0.35% of global GDP and of between

0.17% to 0.23% of worldwide employment (World Bank, 2021). As can be seen in Fig. 2, the direct losses in the air transport industry, with 65 to 88 million USD in GVA and 1.1 to 1.5 million jobs, account for only a part of the total effect. The indirect losses in industries upstream the value chain, such as airports and aircraft manufacturers, are, with 113 to 153 million USD in GVA and 2.9 to 4 million jobs, between one and a half (GVA) to two and a half times as large (employment). Added to this are the induced losses due to reduced consumption as a result of the decline in direct and indirect employment.

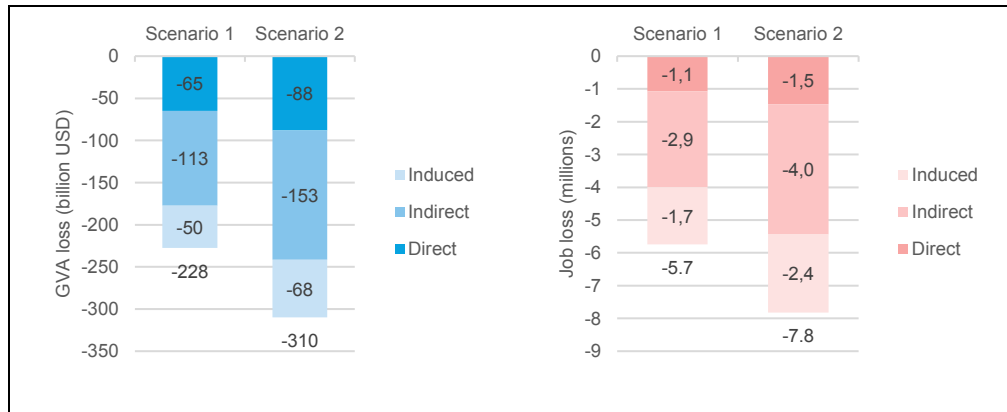


Fig. 2. Potential impacts of COVID-19 on GVA and employment in global aviation

#### 4. Governmental support for the economic recovery of the air transport sector

Governmental support for the air transport sector is mostly considered to be in the strategic interest of the majority of countries because of its positive effects on GDP, employment and connectivity. Forsyth (2019) shows under which circumstances a country gains or loses due to a subsidy to a national as well as to a foreign airline. Gössling (2020) speculates that subsidies might already have led to an aviation overcapacity and claims that air transport is still not paying sufficiently for its negative external effects, i.e. its contribution to climate change and the global distribution of pathogens.

According to the results of our research, airlines in most countries of the world have been receiving public support due to the pandemic. Until September 2020, airlines worldwide received at least 161 billion USD (IATA, 2020). Interestingly, airports mostly did not get comparable support as they are predominantly in public ownership, even though a number of airports have been literally begging for funding (Airport Council International Europe, 2020).

The choice of governmental supporting measures is not a trivial task as it will be influencing the market structure and competitive situation in aviation. An overview on subsidies in aviation can be found in (Gössling et al., 2017). Bock (2019) even consider whether Chapter 11 regulations could be regarded as a subsidy. In general, supporting measures should be granted in a transparent and non-discriminatory way. Otherwise, it is at risk not to support the most productive companies as they will be able to survive economically longer without state aid than their less productive competitors. And the competitive situation which is already quite tense on many routes (OECD, 2020) will lead to further concentration effects. A structured overview of the pros and cons of different supporting policy measures is provided in the Table 1.

Currently, government loans or government secured loans are used in most countries for supporting the air transport sector economically. The lending criteria chosen by the governments plays an important role at this point. If the lending criteria are transparent and nondiscriminatory, a well-balanced trade-off between governmental influence, public debt and distortion of competition will be enabled. In case that the lending criteria are non-transparent and discriminatory, competitive distortions are likely. In France and Germany, for instance, only the national flag carrier received public funding. To ease the risk of endangering a level playing field on routes served by these airlines, Lufthansa had to pass some slots to competitors, and Air France now has to fulfil a CO<sub>2</sub> reduction obligation imposed by the French government. Whether these measures will be ensuring a level playing field remains to be seen.

However, in the course of time, over-indebtedness will become a critical issue for most companies in the air transport sector. Non-refundable state grants offer a relatively simple but costly solution at this point, since these subsidies will directly increase public debt. As governmental health measures are mainly responsible for the dramatic economic situation in the aviation sector, non-discriminatory and non-refundable funding which should be combined with regulations for other governmental targets, for instance CO<sub>2</sub> reduction, will be recommendable. This way, insolvencies, undesired concentrations effects and employment losses can be avoided to the most possible extent.

Table 1. Pros and cons of different supporting policy measures

Policy measure	Management view	Economic view
No governmental support	Pros: <ul style="list-style-type: none"> <li>No governmental influence</li> </ul> Cons: <ul style="list-style-type: none"> <li>Risk of insolvency (illiquidity or excess debt). Need to raise capital on the capital market</li> </ul>	Pros: <ul style="list-style-type: none"> <li>No public need for capital. No distortion of competition in the short run</li> </ul> Cons: <ul style="list-style-type: none"> <li>No governmental influence on sectoral developments, transport supply and employment</li> </ul>
Muddling Through	Pros: <ul style="list-style-type: none"> <li>Only short-term governmental influence</li> </ul> Cons: <ul style="list-style-type: none"> <li>Ongoing risk of insolvency (illiquidity or excess debt) Need to raise capital on the capital market</li> </ul>	Pros: <ul style="list-style-type: none"> <li>Minor public need for capital</li> <li>Short-term job security due to short-time work</li> <li>No distortion of competition if all carriers benefit the same way</li> </ul> Cons: <ul style="list-style-type: none"> <li>Minor governmental influence on sectoral developments and transport supply</li> </ul>
Government-backed loan	Pros: <ul style="list-style-type: none"> <li>Minor governmental influence</li> <li>Easier access to debt capital, lower interest rates</li> </ul> Cons: <ul style="list-style-type: none"> <li>Risk of excess debt</li> </ul>	Pros: <ul style="list-style-type: none"> <li>No public need for capital</li> <li>Minor distortion of competition</li> </ul> Cons: <ul style="list-style-type: none"> <li>Credit risk takeover by the public</li> </ul>
Government loan	Pros: <ul style="list-style-type: none"> <li>Minor governmental influence</li> <li>Guaranteed access to debt capital, low interest rates</li> </ul> Cons: <ul style="list-style-type: none"> <li>Risk of excess debt</li> <li>Less managerial freedom if political conditions are linked to the measure</li> </ul>	Pros: <ul style="list-style-type: none"> <li>Minor distortion of competition</li> </ul> Cons: <ul style="list-style-type: none"> <li>Public need for capital</li> <li>Credit risk takeover by the public</li> <li>Risk of less efficient operations at the expense of the taxpayer</li> </ul>
Non-repayable grant	Pros: <ul style="list-style-type: none"> <li>Minor governmental influence</li> <li>Increases equity</li> </ul>	Cons: <ul style="list-style-type: none"> <li>Public need for capital</li> <li>Increases public debt</li> <li>High risk of distortion of competition</li> </ul>

	Cons: <ul style="list-style-type: none"> <li>• Less managerial freedom if political conditions are linked to the measure</li> </ul>	<ul style="list-style-type: none"> <li>• Risk of less efficient operations at the expense of the taxpayer</li> </ul>
Government involvement	Pros: <ul style="list-style-type: none"> <li>• Increases equity</li> <li>• Dilution of equity</li> </ul> Cons: <ul style="list-style-type: none"> <li>• High governmental influence</li> </ul>	Pros: <ul style="list-style-type: none"> <li>• Governmental influence on sectoral developments, transport supply and employment</li> </ul> Cons: <ul style="list-style-type: none"> <li>• Public need for capital</li> <li>• High risk of distortion of competition</li> <li>• Risk of less efficient operations at the expense of the taxpayer</li> </ul>
Combination	<ul style="list-style-type: none"> <li>• Advantages and disadvantages depend on used measured mentioned above</li> </ul>	<ul style="list-style-type: none"> <li>• Advantages and disadvantages depend on used measured mentioned above</li> </ul>

Source: DLR compilation.

## 5. Conclusions

The COVID-19 pandemic has caused a global, existence-threatening crisis in global aviation. Governmental support for airlines is in the strategic interest of the majority of countries. This paper investigates whether and how the economic recovery of the aviation sector should be supported.

Our main results indicate that government loans or government secured loans should be favored when choosing supportive policy measures in the aviation industry. They both offer a well-balanced trade-off from a management as well as an economic point of view: On the one hand, direct governmental influence on management decisions and the potential distortion of competition in the highly competitive aviation industry can be kept at a minimum level, while providing easy access to debt capital and low interest rates when lending criteria are transparent and nondiscriminatory. On the other hand, the risk for excess debt of individual companies and for the credit risk to be taken over by the public have to be taken into account when implementing government(-secured) loans as preliminary support action.

However, in the course of time, excess debt will become a critical issue for most companies. At this point, non-refundable state grants offer a relatively simple but costly solution since these subsidies will directly increase public debt. The specific effects of granting governmental loans on the economic recovery of the aviation sector as well as on the development of financial structures and the competitiveness of individual companies need to be further investigated over time. In general, the dynamic of COVID-19 infections and vaccinations has to be taken into account when considering governmental support for aviation, too.

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